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Article 34

Claims

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1. Electric machine (10; 10') with a rotor (26a, 26b; 26c; 36) which is rotatably mounted in a housing (12) with a rotor shaft (24) which extends beyond the housing, a plurality of electromagnet components (28) which are statically disposed in the housing at uniform angular spacings and spaced from the axis of rotation of the rotor, each with a coil core (32) bearing a coil winding (30) consisting of one or more conductors and with permanent magnets (27) which are disposed at uniform angular spacings and are non-rotatably retained in or on the rotor, these permanent magnets each having a pole face aligned opposite the end faces of the coil cores (32) and each having a polarity which is successively reversed in the peripheral direction, wherein the coil cores (32) of the electromagnet components (28) are disposed parallel to the axis of rotation of the rotor shaft (24) in the interior of the housing in such a way that their opposing end faces each lie in two planes which are spaced from one another and extend at right angles to the axis of rotation of the rotor shaft and the ends of the electric conductors which form the coil winding (30) of the individual electromagnet components (28) are interconnected via an electric or electronic control device to form at least two pairs of electrical connections characterised in that

the rotor has at least two outer armature discs (26a, 26b; 26c) which extend radially to before the end faces of the coil cores and in which the permanent magnets are retained,

that in each case pairs of legs, which succeed one another in the peripheral direction and are each provided with a pole face of different polarity on the free end facing the coil, of the permanent magnets (27) provided in the two opposing outer armature discs (26a, 26b) are connected to one another in the end regions remote from the pole faces by a respective yoke (27a) which encloses the magnetic field and is made from soft or hard magnetic material,

that the armature discs (26a, 26b) are connected to one another by radially extending walls (38; 38') which form the cavity between the armature discs into a plurality of chambers (40)

which are offset with respect to one another in the peripheral direction and are open towards the electromagnet components (28), and

in that the armature discs are provided with radially inner holes (46) each opening into the chambers (40) of the rotor.

2. Machine as claimed in Claim 1, characterised in that a row of electromagnet components (28) is provided in the interior of the housing of the machine, and that the rotor has two outer armature discs (26a, 26b) guided on opposing sides in front of the coil core end faces of the electromagnet components (28).

3. Machine as claimed in Claim 1, characterised in that two or more rows of electromagnet components (28) spaced from one another in the longitudinal direction of the rotor shaft are disposed in the interior of the housing, and that in addition to the two outer armature discs (26a, 26b) which are guided in front of the outer end faces of the coil cores (32), pointing in opposite directions, of the outermost rows the rotor has an additional armature disc (26c) with permanent magnets (27) guided into each space between adjacent rows of electromagnet components (28) in front of the end surfaces thereof which face one another, and the pole faces of differing polarity of the permanent magnets (27) which are each exposed on opposing sides of the respective additional armature disc are aligned in the radial direction with the end faces of the coil cores (32) of the rows of electromagnet components.

4. Machine as claimed in one of Claims 1 to 3, characterised in that the interior of the housing is closed off and sealed against the external atmosphere.

5. Machine as claimed in Claim 4, characterised in that the outer and/or inner face of the housing (12) is provided with ribs in order enlarge the surface of the housing which gives off or takes up heat.

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6. Machine as claimed in Claim 5, characterised in that radially extending ribs are provided on the inner faces of the housing end walls (14a; 14b) facing the rotor and between these ribs radial channels are formed for the return of the gaseous atmosphere circulated in the interior of the housing.

7. Machine as claimed in Claim 6, characterised in that the radial channels are closed off on the armature disc side by a metal plate so that between the radial walls (38; 38') channels are produced which are open only on the radially inner and radially outer end and are connected to the interior of the housing and through which the circulated air is returned.

8. Machine as claimed in one of Claims 1 to 3, characterised in that air inlet openings are provided in regions of the housing (12) lying opposite the holes (46) in the armature discs (26a; 26b) and air outlet openings which are offset radially outwards are provided in the housing (12).

9. Machine as claimed in one of Claims 1 to 8, characterised in that the electromagnet components (28) are disposed at uniform spacings in the peripheral direction and protrude from the inner face of the peripheral housing wall (16) into the space formed between the armature discs (26a, 26b).

10. Electric machine (10; 10') with a rotor (26a, 26b; 26c; 36) which is rotatably mounted in a housing (12) with a rotor shaft (24) which extends beyond the housing, a plurality of electromagnet components (28) which are statically disposed in the housing at uniform angular spacings and spaced from the axis of rotation of the rotor, each with a coil core (32) bearing a coil winding (30) consisting of one or more conductors and with permanent magnets (27) which are disposed at uniform angular spacings and are non-rotatably retained in or on the rotor, these permanent magnets each having a pole face aligned opposite the end faces of the coil cores (32) and each having a polarity which is successively reversed in the peripheral direction, wherein the coil cores (32) of the electromagnet components (28) are disposed parallel to the axis of rotation of the rotor shaft (24) in the interior of the housing in such a way that their opposing end faces each lie in two planes which are spaced from one another and extend at right angles to the axis of rotation of the rotor shaft and the ends of the electric conductors which form the coil winding (30) of the individual electromagnet components (28) are interconnected via an electric or electronic control device to form at least two pairs of electrical connections particularly as claimed in one of Claims 1 to 9,

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characteri[illegible]in that each pole face of the permanent magnets (27) has in the peripheral direction an extent which covers two pole faces of the coils (30, 32) of two electromagnet components (28) which succeed one another in the peripheral direction, and that the control means is designed so that in order to drive the rotor this control means switches over the polarity of every second one of the electromagnet components which succeed one another in the peripheral direction with each rotation of the rotor about an angular spacing which corresponds to the angular spacing between two electromagnet components (28) which succeed one another in the peripheral direction.

11. Electric machine (10; 10') with a rotor (26a, 26b; 26c; 36) which is rotatably mounted in a housing (12) with a rotor shaft (24) which extends beyond the housing, a plurality of electromagnet components (28) which are statically disposed in the housing at uniform angular spacings and spaced from the axis of rotation of the rotor, each with a coil core (32) bearing a coil winding (30) consisting of one or more conductors and with permanent magnets (27) which are disposed at uniform angular spacings and are non-rotatably retained in or on the rotor, these permanent magnets each having a pole face aligned opposite the end faces of the coil cores (32) and each having a polarity which is successively reversed in the peripheral direction, wherein the coil cores (32) of the electromagnet components (28) are disposed parallel to the axis of rotation of the rotor shaft (24) in the interior of the housing in such a way that their opposing end faces each lie in two planes which are spaced from one another and extend at right angles to the axis of rotation of the rotor shaft and the ends of the electric conductors which form the coil winding (30) of the individual electromagnet components (28) are interconnected via an electric or electronic control device to form at least two pairs of electrical connections particularly as claimed in one of Claims 1 to 9,

characterised in that three pole faces of the coils (30, 32) of three electromagnet components (28) which succeed one another in the peripheral direction can be associated with each pole face of the permanent magnets (27), in which case the control means is designed so that in order to drive the rotor, after the rotor has rotated by an angular spacing corresponding to the angular spacing between electromagnet components which succeed one another in the peripheral direction, the control means switches over the polarity of every third one of the electromagnet components (28) which succeed one another in the peripheral direction

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12. Electric machine (10; 10') with a rotor (26a, 26b; 26c; 36) which is rotatably mounted in a housing (12) with a rotor shaft (24) which extends beyond the housing, a plurality of electromagnet components (28) which are statically disposed in the housing at uniform angular spacings and spaced from the axis of rotation of the rotor, each with a coil core (32) bearing a coil winding (30) consisting of one or more conductors and with permanent magnets (27) which are disposed at uniform angular spacings and are non-rotatably retained in or on the rotor, these permanent magnets each having a pole face aligned opposite the end faces of the coil cores (32) and each having a polarity which is successively reversed in the peripheral direction, wherein the coil cores (32) of the electromagnet components (28) are disposed parallel to the axis of rotation of the rotor shaft (24) in the interior of the housing in such a way that their opposing end faces each lie in two planes which are spaced from one another and extend at right angles to the axis of rotation of the rotor shaft and the ends of the electric conductors which form the coil winding (30) of the individual electromagnet components (28) are interconnected via an electric or electronic control device to form at least two pairs of electrical connections particularly as claimed in one of Claims 1 to 9, characterised in that more than three pole faces of the coils of electromagnet components which succeed one another in the peripheral direction can be associated with each pole face of the permanent magnets, in which the case the control means is designed so that in order to drive the rotor, after the rotor has rotated by an angular spacing corresponding to the angular spacing between electromagnet components which succeed one another in the peripheral direction, the control means successively switches over the polarity of every one of the electromagnet components, which succeed one another in the peripheral direction, of the group of electromagnet components associated with a permanent magnet.

13. Machine as claimed in one of Claims 10 to 12, characterised in that a position pick-up which senses the relative rotational position of the rotor in the housing (12) is associated with

the control device for initiating the switching over of the polarity of the electromagnet components (28)

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14. Machine as claimed in Claim 13, characterised in that the position pick-up is constructed as a contactless sensor, particularly an optical sensor, which senses the relative rotational position of the rotor with respect to the housing.

15. Machine as claimed in one of Claims 1 to 14, characterised in that the electromagnet components (28) are each held on separate support elements which can each be installed in an associated opening the in the peripheral wall (16) of the housing (12) in such a way that the pole faces of the coils of the electromagnet components (28) are in the prescribed assembly position in alignment with the pole faces of the permanent magnets (27) between the armature discs.

16. Machine as claimed in one of Claims 4 to 14, characterised in that electromagnet components (28) as a whole are pre-installed in an annular mounting, which in turn is held in the interior of the housing.

17. Machine as claimed in one of Claims 1 to 16, characterised in that the electromagnet components (28) each have two separate coils with opposed directions of winding (reversed-polarity differential windings 30a, 30b respectively), and that an electric or electronic control device (EC) is provided for the selective electric control of each of the coil windings (30a; 30b).

18. Machine as claimed in one of Claims 1 to 17 which operates as a generator, characterised in that the ends of the electrical conductors of each electromagnet component (28) which form the coil winding (30) are connected to the input connections of a separate rectifying circuit, and that the rectifying circuits are connected on the output side to a pair of electric bus lines.

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19. Machine as claimed in Claim 18, characterised in that an electronic inverter circuit is connected downstream of the generator in order to convert the generated direct current into an alternating or three-phase current which is synchronised with the power supply.